Environmental Energy Technologies Division

2012 Self-Assessment Project 3

A Self-Assessment of Lab Area Hood Sash Height Effectiveness

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Approved by:

for Ashok Robert Kostelnik

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Date

Introduction

Hazardous materials are used in designated lab area fume hoods. Airborne concentrations of contaminants that could pose a risk to employees are generated when working with flammable, corrosive, or toxic chemicals inside the hood. The hoods are connected to building exhaust fans that draw air from the hoods to the outside of the building. In order to effectively capture airborne contaminants, the face velocity of air at the hood sash must be an average of 100 linear feet per minute (fpm). Hood sashes can be manually opened and closed. The more the hood sash is opened, the more air is needed in order to maintain average face velocity.

Providing exhaust air to fume hoods is highly energy intensive. A typical six-foot hood exhausting air at 100 fpm and open 18 inches exhausts almost 1.5 million cubic feet of conditioned air every day. The amount of energy required to operate the exhaust fans, heating, and condition the air exhausted for one 6-foot hood is 3.5 times more than an average home. It is estimated that it costs approximately $3,300 per year to operate a 6-foot hood with the sash left open at 18 inches. The same hood with a closed sash costs approximately $200 per year to operate. By keeping the hood sashes closed when not in use and reducing the amount of air exhausted, a significant energy cost savings can be achieved. Past observations of EETD fume hoods indicate that many are left opened when not in use, particularly during the off hours and weekends.

This self-assessment report describes a project involving EETD laboratory area fume hood sash height measurements and associated reductions in energy use due to decreases in the volume of air exhausted from each room. The project involved preliminary measurement of hood sash heights in each lab area, implementation of an employee hood sash height awareness program, and follow-up hood sash height measurements to determine effectiveness.

Requirements

Lab area fume hood requirements are described in the following documents:

- LBNL Pub-3000, Chapter 4.6, "Ventilation, Hoods, and HEPA Filters"
- LBNL Chemical Hygiene Safety Plan (CHSP), "Selection and Use of Engineering Controls"

The EHSS Division checks fume hoods for proper airflow every other year. This is documented in a centralized database as well as the use of an inspection sticker affixed to each hood. Fume hoods that do not meet minimum airflow requirements are taken out of service until repaired. Within EETD, each fume hood is equipped with a digital airflow monitor that displays face velocity. A localized audible/visual alarm at the hood is activated when face velocity is below or above the low and high alarm set points.

All EETD personnel who handle hazardous materials in the wet lab areas must complete EHS0348 "Chemical Hygiene and Safety" training. This ensures employees are aware of chemical hazards and the use of engineering controls to protect themselves from these hazards.

Methodology

The following methodology was used to conduct this hood sash height self assessment project:

1. A total of 37 EETD lab areas consisting of 59 fume hoods were identified for this project.
2. A project team consisting of **Ron Scholtz** (EETD Safety Manager), **Dan Best** (EHSS Division Industrial Hygienist), and **Laurel Davis** (EHSS Division Industrial Hygienist and Ventilation Program Manager) was established to perform hood sash measurements.
3. Preliminary baseline measurements of hood sash heights were taken at each of the 59 fume hoods. The measurements were taken without the knowledge of lab area personnel. The measurements were also made early in the morning before the labs were in use. Two separate rounds of preliminary measurements were made.
4. At the same time preliminary measurements were made, fume hood housekeeping practices were evaluated. Each hood was rated on a scale of 10-0 with a "10" being excellent and a "0" being poor. This rating was based on the team's observations of container storage, use of containment trays, container condition and labeling, equipment use, and general clutter. These are factors that can influence effective airflow inside the hood.
5. Following the preliminary baseline measurements, an employee awareness campaign was implemented to promote closure of hood sashes when not in use. This consisted of application of colored reminder stickers on each hood (Attachment 3), development of "Fume Hood Safety" training materials (Attachment 4), distribution of a "Safety Alert" to lab personnel (Attachment 5), as well as posting of a reminder flyer (Attachment 6).
6. Following the awareness campaign, follow-up measurements of hood sash heights were taken at each of the 59 fume hoods. The measurements were taken without the knowledge of lab area personnel. The measurements were also made early in the morning before the labs were in use. Two separate rounds of follow-up measurements were made.
7. At the same time follow-up measurements were made, fume hood housekeeping practices were evaluated. Each hood was rated on a scale of 10-0 with a "10" being excellent and a "0" being poor. This rating was based on the team's observations of container storage practices, use of containment trays, container condition and labeling, equipment use, and general clutter.
8. A spreadsheet was maintained to document all measurements and observations made on each fume hood.

The scope of this project applied to the following:

1. Wet chemistry labs belonging to EETD in Buildings 62 and 70. This includes: 62-138, 62-220, 62-246, 62-308, 62-310, 62-312, 62-314, 62-320, 62-342, 62-348, 62-350, 70-103, 70-108, 70-123, 70-134, 70-138, 70-157, 70-163, 70-173, 70-201, 70-215, 70-217, 70-218, 70-220, 70-221/223, 70-226, 70-249, 70-257, 70-260, 70-263, 70-269, 70-274, 70-275, 70-289, 70-291/293, and 70-295/299.
2. Fume hoods located inside the above listed lab areas are used for work with hazardous chemicals that are flammable, corrosive, or toxic.

The following were excluded from the scope of this project:

1. Glove boxes
2. Extractor arms
3. Soldering benches

4. Exhausted ovens and analytical equipment
5. Biological safety cabinets
6. Electricity usage data for Buildings 62 and 70 was not available as part of this project.

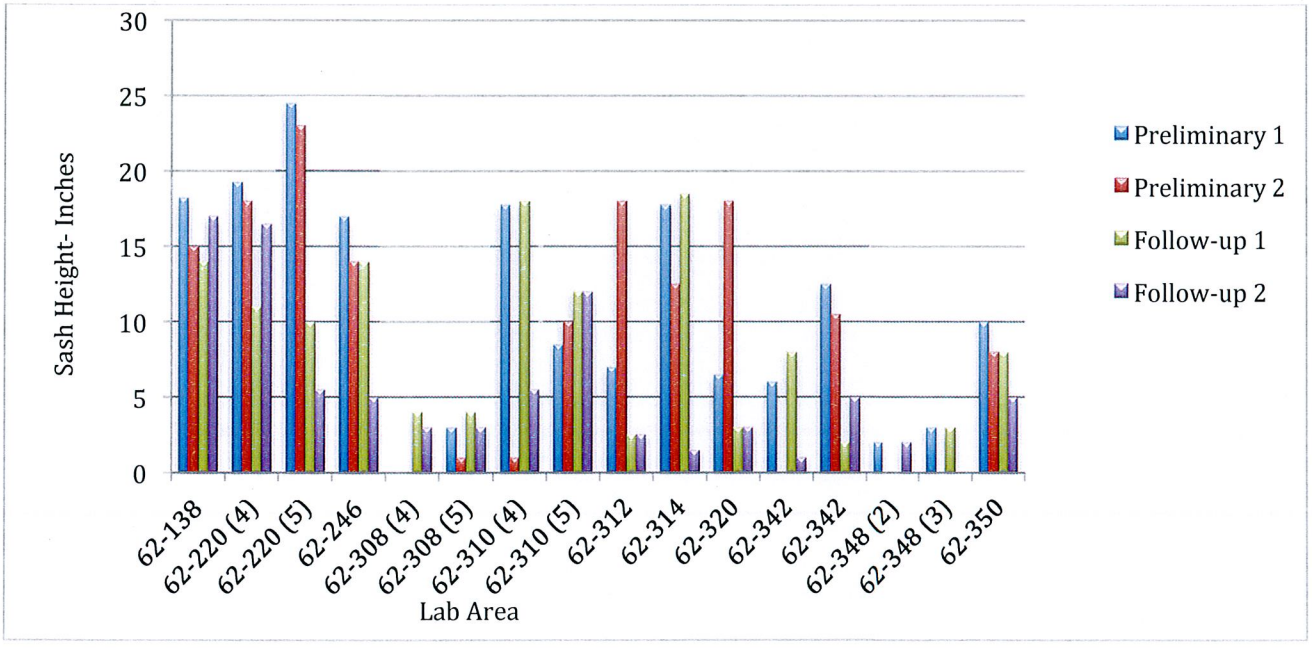
Summary of Findings, Observations and Noteworthy Practices

Hood Sash Height Measurements

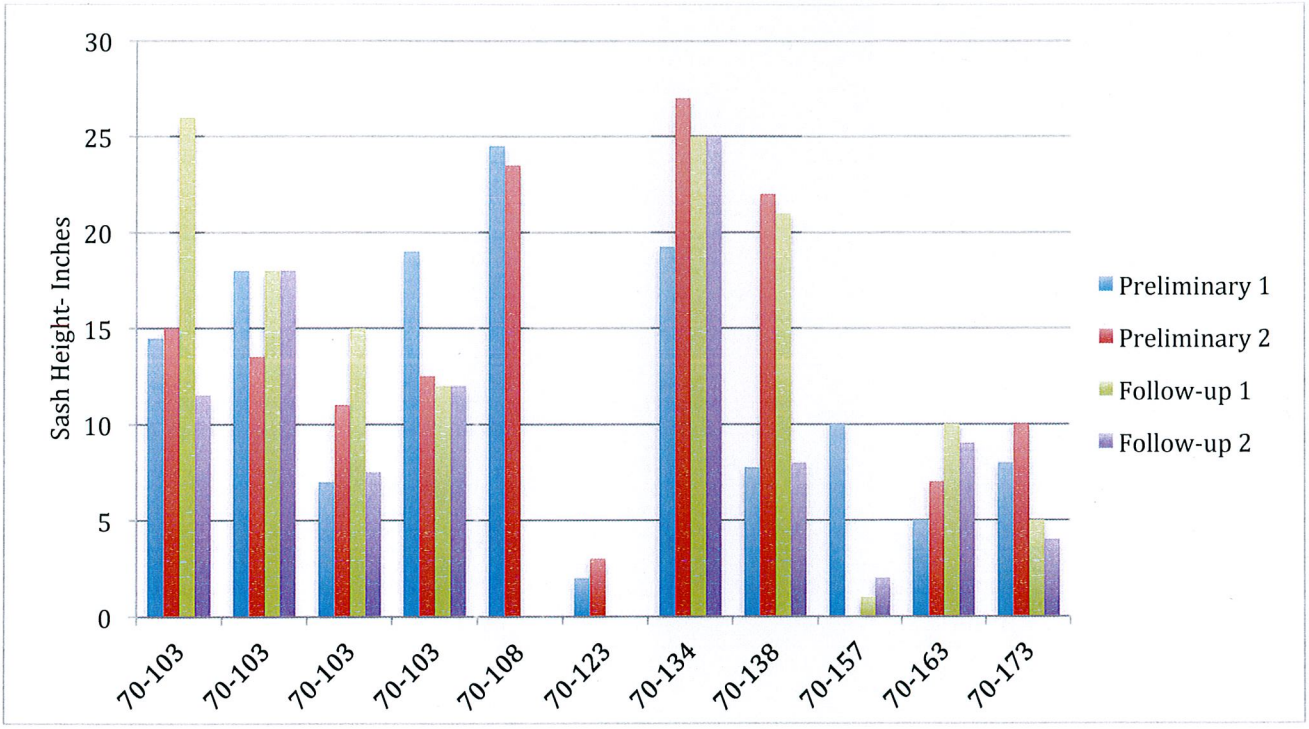
Preliminary and follow-up hood sash measurements are documented in Attachment 1. Average sash height from the first preliminary round of measurements was 13.3 inches. The second round of preliminary sash height measurements averaged 12.8 inches. An overall average preliminary hood sash height is 13.1 inches. Average sash height from the first follow-up round of measurements was 11.1 inches. The second round of follow-up sash height measurements averaged 8.2 inches. An overall average preliminary hood sash height is 9.6 inches. The net reduction in hood sash height from the start of this self-assessment until its conclusion is therefore 26%.

The following is a summary of the observations made during this portion of the project:

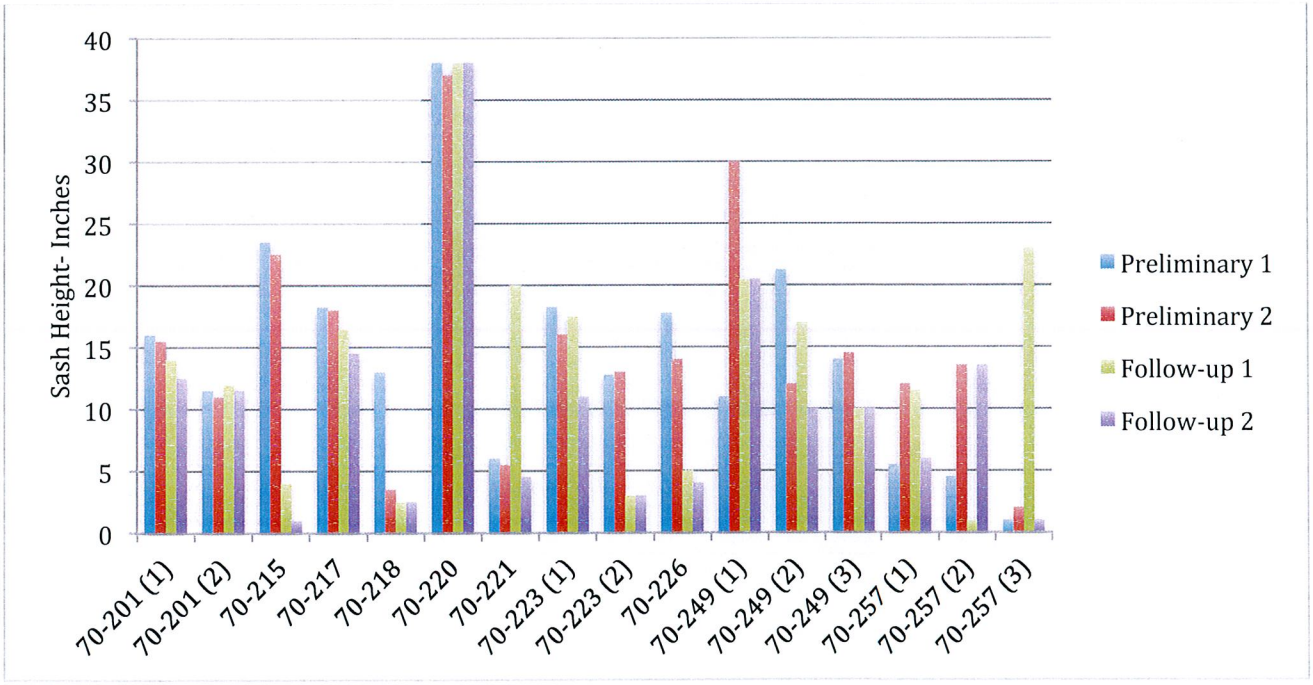
Building 62 EETD Lab Areas



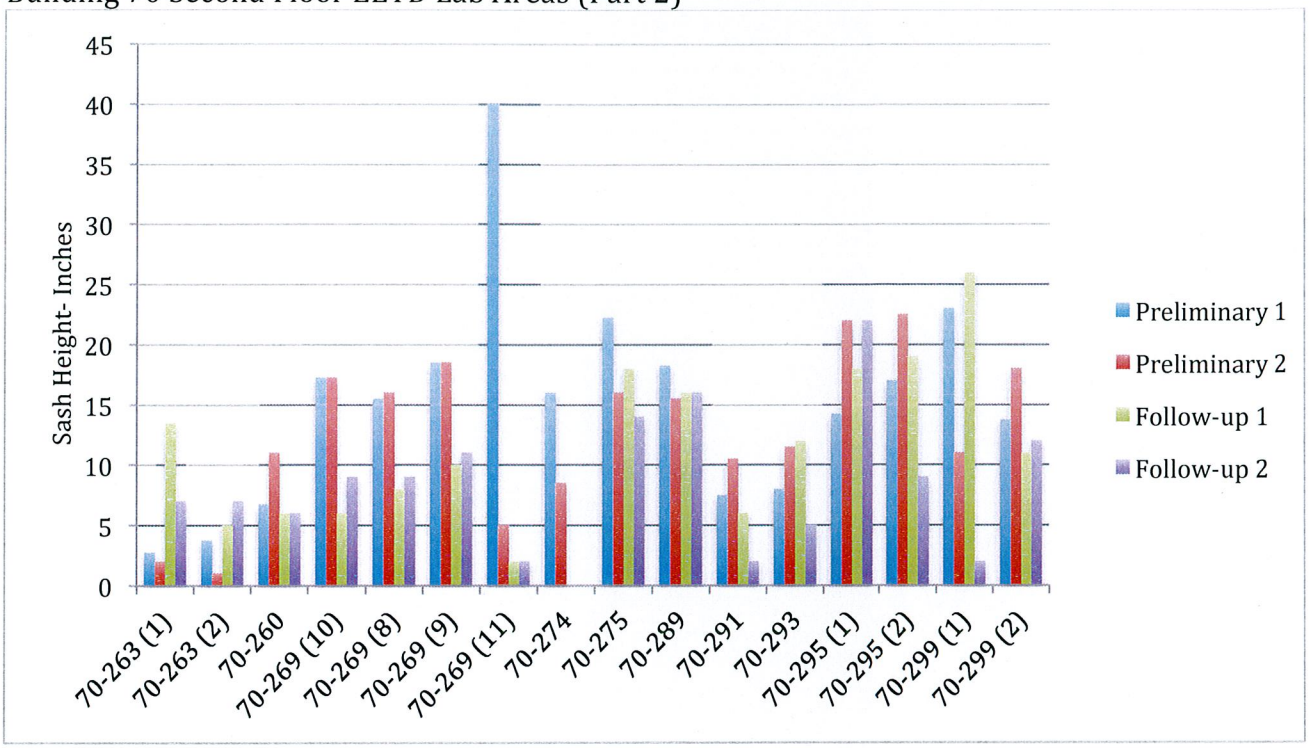
Building 70 First Floor EETD Lab Areas



Building 70 Second Floor EETD Lab Areas (Part 1)



Building 70 Second Floor EETD Lab Areas (Part 2)



Noteworthy Practices:

- Lab areas that demonstrated significant improvement in sash height adjustment included: 62-342, 62-348, 70-108, 70-123, 70-215, and 70-223.
- All fume hoods were found to be operating within the required 100 fpm average face velocity requirement.
- All fume hoods had operable audible and visible flow alarm systems installed.
- All fume hoods were current for their biennial performance evaluations by EHSS Division.

Suggestions:

- Actual building energy usage data was not available as part of this project. Making this information available to lab users and EETD management on an on-going basis would be useful in promoting good hood sash use practices.

Findings:

- Lab areas that need to show improvement in keeping hood sashes closed include: 62-138, 70-103 (1-4), 70-134, 70-201, 70-217, 70-220, 70-249, 70-289, and 70-295.

Hood Sash Awareness Program

The hood sash awareness program was launched just after the preliminary hood sash measurements were completed. This consisted of application of hood sash reminder stickers on each hood, an EETD "Safety Alert" issued to all lab PI's and lab safety leads, a reminder poster was

placed on bulletin boards, and a general reminder message placed into the weekly EETD "What's New" email bulletin. In addition, hood safety training materials were developed and included with the Safety Alert.

Noteworthy Practices:

- A brief training session on hood sash safety was performed for Jordi Cabana-Jimenez's group (Lab 62-342). The information and discussion was well received.
- All EETD hood sashes now have colorful energy savings reminder stickers affixed.
- Use of multiple communications tools was needed.

Suggestions:

- Awareness and communications efforts regarding hood sash use needs to continue. This can include reminder "Safety Alerts" and incorporation into "On the Job Training" efforts.
- Other LBNL divisions that use fume hoods should consider use of the sash stickers and communications efforts.
- Building energy usage and associated costs needs to be communicated regularly to EETD lab personnel.

Findings:

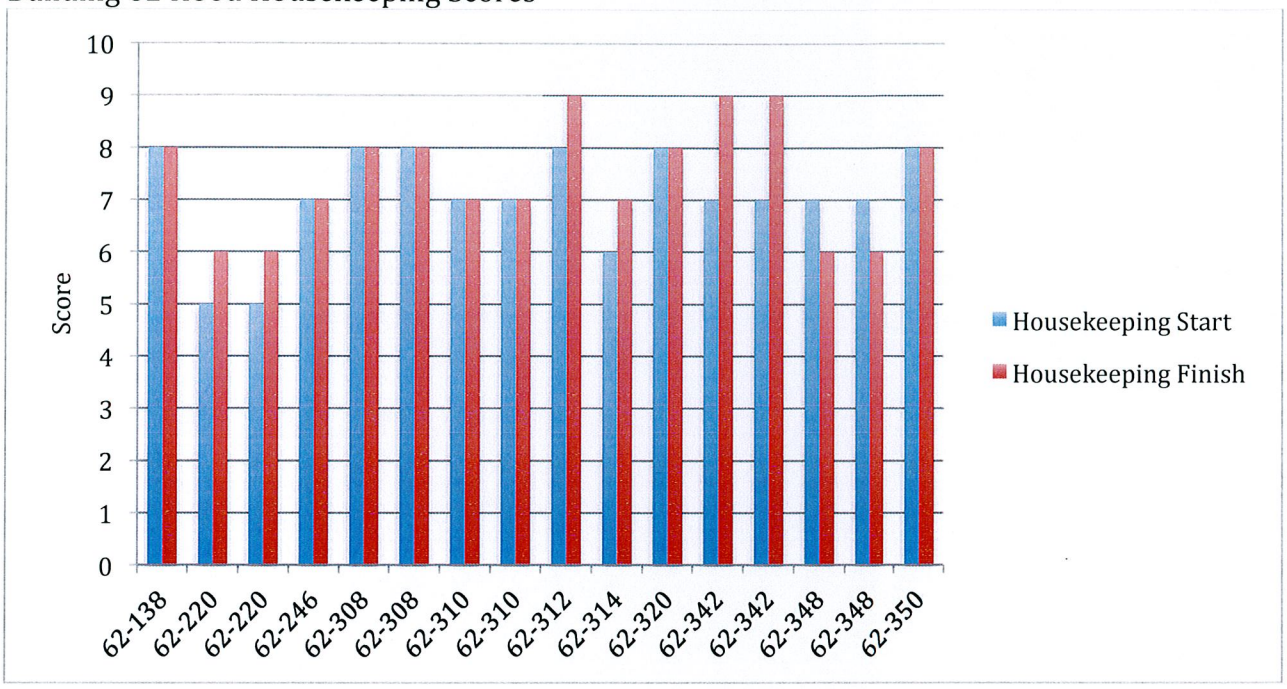
- Hood sash training information generated from this self-assessment should be incorporated into the on-line training provided to lab personnel. This could include the EHS0348 "Chemical Hygiene and Safety" training currently required.
- EETD is currently updating its website to include more current safety information. Information generated from this self-assessment should be included in the new website.
- Laminated hood sash awareness posters should be strategically placed in Buildings 62 and 70.

Hood Maintenance and Housekeeping

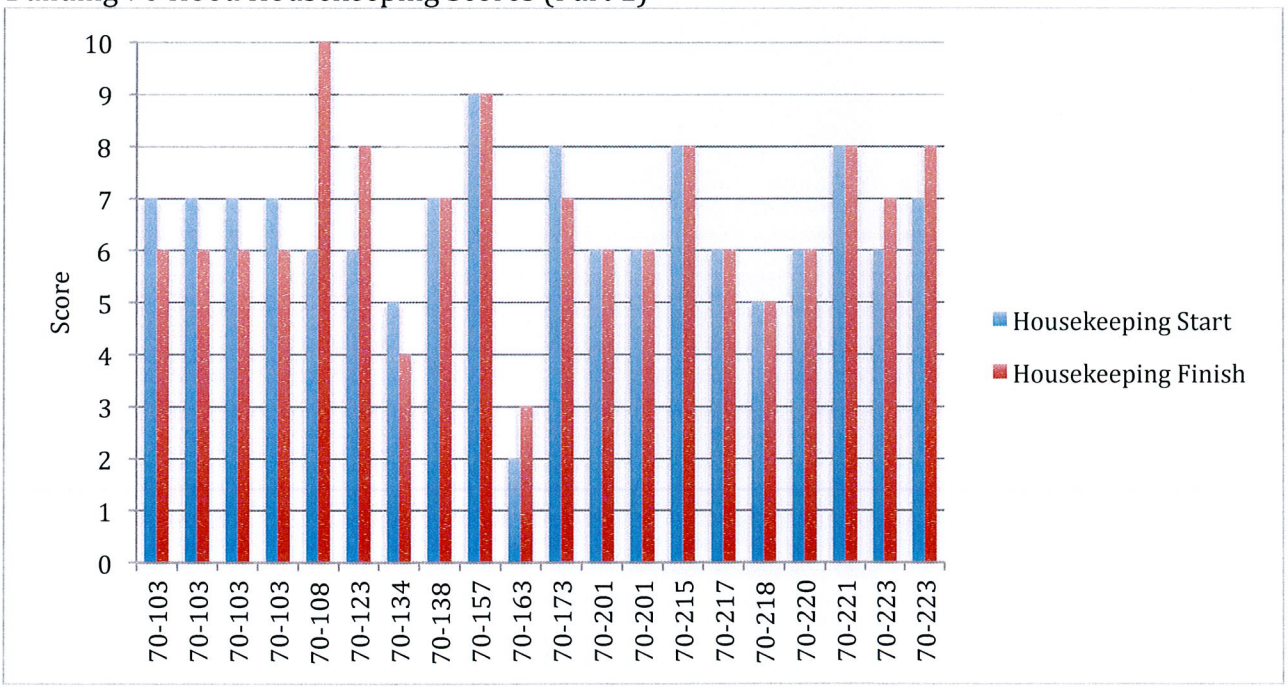
Fume hood housekeeping ratings are presented in Attachment 2. This includes preliminary and follow-up housekeeping ratings. The average housekeeping score for all fume hoods inspected during the preliminary round was 6.6. The average housekeeping score for all fume hoods inspected during the follow-up round was 6.92. This resulted in an improvement of 4.9% overall.

A summary of these observations is as follows:

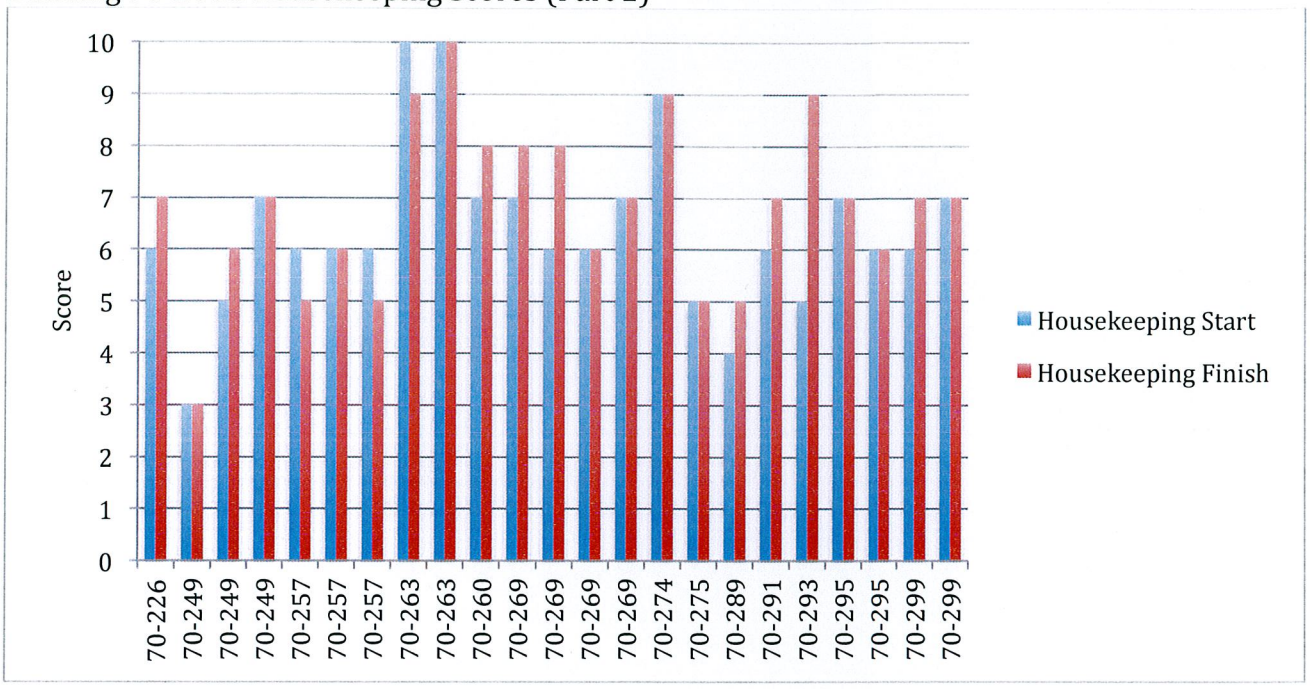
Building 62 Hood Housekeeping Scores



Building 70 Hood Housekeeping Scores (Part 1)



Building 70 Hood Housekeeping Scores (Part 2)



Noteworthy Practices:

- The area safety lead for lab area 70-108 installed simple wire racks in the hood in order to elevate containers and equipment. This results in better air flow and capture towards the rear of the hood. This was a simple yet effective improvement and is considered a best practice. (See photo in Attachment 7).
- Good hood housekeeping practices were observed in several lab areas. Of note, high scoring labs with final scores >8 include: 62-138, 62-308, 62-312, 62-320, 62-342, 62-350, 70-108, 70-123, 70-157, 70-215, 70-221, 70-223, 70-260, 70-263, 70-269, and 70-274 and 70-293.

Suggestions:

- The quarterly lab area inspections currently being performed should be updated to include checks on fume hood condition and use of hood sashes.
- A better way for rating fume hood housekeeping is needed. A rating system consisting of 10 key items could be developed where each item constitutes a point. Having a closed sash might be given multiple points.
- The older "wooden" sashes have repair and alarm issues. LBNL should consider giving these fume hoods priority for replacement and upgrade to newer hoods with easy to use sashes. This may need to involve institutional funding. The energy savings may justify a quick payback.

Findings:

- A number of hoods had high flow alarm issues when the sashes were closed. As a result, operators are not able to close the sash doors when not in use. This may be due to dampers

that are not automatically adjusting fast enough. More work needs to be done on the dampers and associated controls to ensure they work properly. (CATS)
- A number of hoods have sticking sashes or mechanisms that do not work at all. As a result, operators are not able to close the sash doors when not in use. The sash doors need to be repaired so that they close easily when needed. (CATS)
- There were several hoods that have other repair issues. In particular, the large hood in 70-220 has a missing door that needs to be replaced. (CATS)
- Several fume hoods need significant improvement in housekeeping. These are: 70-163, 70-134, and 70-249. Others are borderline and should be checked regularly to ensure there is improvement. (CATS)

Conclusions and Future Improvements

Conclusions

The following improvements to the EETD wet lab areas have been made as a result of this self-assessment project:

1. There was an overall reduction of 26% in observed overall hood sash heights during the project. There is room for further improvement.
2. There was only a 5% overall improvement in hood housekeeping. While some hoods were considerably improved, there were still others that did not. Fume hood housekeeping practices need to be looked at further and should be a focus in upcoming self-assessment activities.
3. Employee awareness and communications efforts can be attributed to the improvements observed, but they need to be continually reinforced.

Recommendations and Suggested Future Improvements

The following recommendations should be addressed in order to improve the use of fume hood sashes and decrease building energy usage/costs:

1. Several fume hoods require repair or replacement so that the sash door can be easily closed when needed.
2. Several fume hoods require repair so that the sash door can be closed without the airflow monitor going into alarm.
3. Employee awareness efforts need to continue on an on-going basis. This includes: sash stickers, reminder posters, on-line training, and On the Job Training. In addition, information generated from this project should be made available on the EETD safety website.
4. Building energy usage data and associated costs should be communicated periodically to all EETD personnel to increase awareness of their impact on electricity usage.
5. Fume hood housekeeping practices need to be regularly checked during quarterly lab inspections. Follow-up is needed to ensure each hood is being maintained to a high standard.

Attachment 1
Hood Sash Measurement Data

Bld	Rm	Hood #	PI	Nominal Hood Size (ft.)	Sash Opening Width (in.)	Sash Stops	Airfoil	Working Sash Height (in.)	3/6/12 Sash Height (in.)	4/24/12 Sash Height (in.)	9/25/12 Sash Height (in)	10/5/12 Sash Height (in)
62	138	1	Doeff	4	40	Yes	Yes	18.25	18.25	15	14	17
62	220	4	Kerr	6	64	Yes (B)	Yes	19.25	19.25	18	11	16.5
62	220	5	Kerr	6	64	Yes	Yes	18.5	24.5	23	10	5.5
62	246	1	Kerr	6	63	Yes	Yes	19.5	17	14	14	5
62	308	4	Kerr	4	39	Yes	Yes	18	0	0	4	3
62	308	5	Kerr	6	63	Yes	Yes	18	3	1	4	3
62	310	4	Richards on	6	63	Yes	Yes	18	17.75	1	18	5.5
62	310	5	Richards on	6	63	Yes	Yes	18	8.5	10	12	12
62	312	1	Richards on	4	39	Yes	Yes	18	7	18	2.5	2.5
62	314	2	Richards on	4	39	Yes	Yes	18	17.75	12.5	18.5	1.5
62	320	2	Richards on	4	39	Yes	Yes	18	6.5	18	3	3
62	342	4	Cabana-Jimenez	8	86.5	No	N/A		6 top 4.75 bottom	0 top 23.5 bottom	8 top 4 bottom	1 top 4 bottom
62	342	5	Cabana-Jimenez	8	86.5	Yes	Yes	18	12.5	10.5	2	5
62	348	2	Balsara	6	63	Yes	Yes	18	2	0	0	2
62	348	3	Balsara	6	63	Yes	Yes	18	3	0	3	0
62	350	4	Richards on	4	39	Yes	Yes	18	10	8	8	5
70	103	1	Lunden	4	47	No	N/A	18	14.5	15	26	11.5
70	103	2	Lunden	4	47	No	N/A	18	18	13.5	18	18
70	103	3	Lunden	4	47	No	N/A	18	7	11	15	7.5
70	103	4	Lunden	4	47	No	N/A	18	19	12.5	12	12
70	108	8	Kostecki	4	40	Yes	Yes	18.75	24.5	23.5	0	0
70	123	7	Balsara	6	62.5	Yes	Yes	18	2	3	0	0
70	134	1	Lunden	6		No	No	29.5	19.25 (L) 19.5 (R	27 (L) 11.5 (R	25 (L) 11 ®	25 (l) 11 ®

70	138	1	Destaillats	4	46.5	No	N/A	17.75	7.75	22	21	8
70	157	2	Russo	4	40	No	Yes	19.25	10		1	2
70	163	1	Mao	4	46	No	No	18	5	7	10	9
70	173	1	Cheng	6	60	No	Yes	19.5	8	10	5	4
70	201	3	Gundel	4	38.5	Yes	Yes	18.25	16	15.5	14	12.5
70	201	4	Gundel	4	38.5	Yes	Yes	18.25	11.5	11	12	11.5
70	215	5	Kirchstetter	4	38.5	No	Yes	19.25	23.5	22.5	4	1
70	217	1	Gundel	4	47	No	N/A	18.25	18.25	18	16.5	14.5
70	218	1	Battaglia	6	62.75	No	Yes	19	13	3.5	2.5	2.5
70	220	1	Mao	6	38	N/A	N/A	38	38	37	38	38
70	221	1	Mandalena	4	46.5	No	N/A	18	6	5.5	20	4.5
70	223	1	Mandalena	4	41.75	No	N/A	18.25	18.25	16	17.5	11
70	223	2	Mandalena	8	87	No	Yes	19.5	12.75	13	3	3
70	226	1	Liu	4	47	No	N/A	18.5	17.75	14	5	4
70	249	1	Mao	4	47	No	N/A	18	11	30	20.5	20.5
70	249	2	Mao	4	47	Yes	N/A	17.5	21.25	12	17	10
70	249	3	Mao	4	42	No	N/A	18	14	14.5	10	10
70	257	1	Weber	6	64	No	Yes	18	5.5	12	11.5	6
70	257	2	Weber	6	64	No	Yes	17.25	4.5	13.5	1	13.5
70	257	3	Weber	8	42	N/A	N/A	23	1	2	23	1
70	263	1	Srinivasan	6	64	No	Yes	18	2.75	2	13.5	7
70	263	2	Srinivasan	6	64	No	Yes	18	3.75	1	5	7
70	260	1	Mandalena	6	60	No	Yes	19.5	6.75	11	6	6
70	269	10	Chang	6	62.5	No	N/A	18.25	17.25 + 2	17.5 + 2	6 + 2	9 + 2
70	269	8	Chang	8	86.5	Yes	Yes	18.25	15.5 + 14	16 + 16	8 + 2	9 + 3
70	269	9	Chang	8	86.5	Yes	Yes	18.5	18.5	18.5	10	11
70	269	11	Chang	8	86.5	Yes	Yes	18.5	40	5 (r + 1 (L)	2 + 3	2 + 3
70	274	8	Slack	8	86.5	Yes	Yes	18.7	16 + 6.75	8.5 + 8.5	0	0

70	275	1	Gundel	8	93.5	No	N/A	18	22.25 + 17.5	16 + 26.5	18 + 26.5	14 + 8.5
70	289	1	Mandale na	4	38	No	Yes	19.25	18.25	15.5	16	16
70	291	1	Lucas	4	38	No	Yes	19.5	7.5	10.5	6	2
70	293	2	Lucas	4	38	No	Yes	19.25	8	11.5	12	5
70	295	1	Battaglia	4	38	No	Yes	19	14.25	22	18	22
70	295	2	Battaglia	4	38	No	Yes	19.25	17	22.5	19	9
070	299	1	Battaglia	6	63	No	Yes	19.25	23	11	26	2
070	299	2	Battaglia	6	63	No	Yes	19.25	13.75	18	11	12

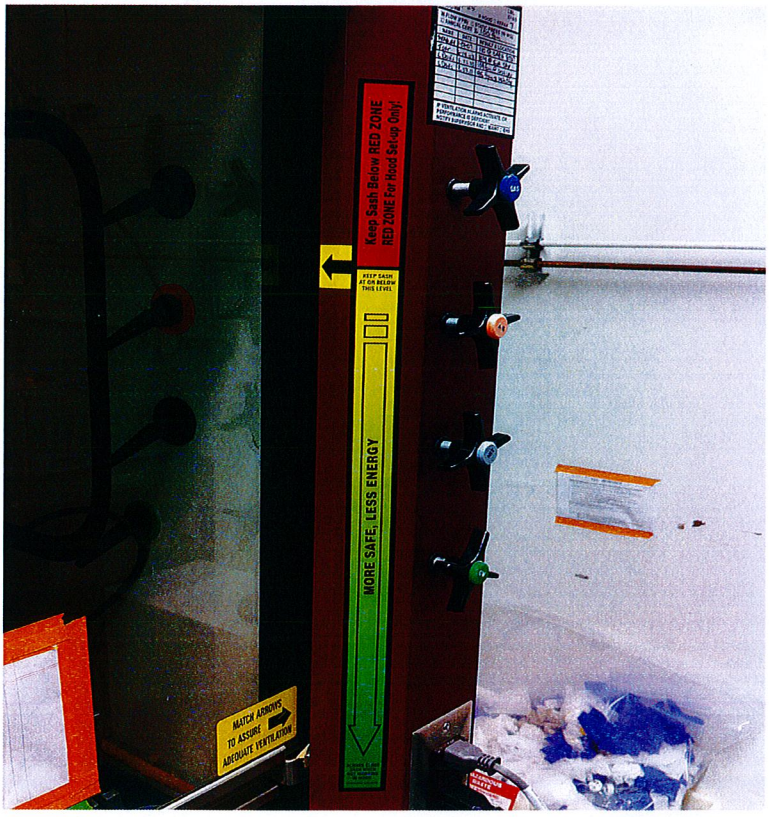
ATTACHMENT 2- Fume Hood Housekeeping and Repair Condition Data

Bldg.	Rm	Hood #	PI	Hood Mfr.	Score Start	Score Final	Hood Sash Condition
62	138	1	Doeff		8	8	Hood sash closure OK
62	220	4	Kerr	Kewaunee Supreme Air	5	6	Hood alarms when sash is closed
62	220	5	Kerr	Kewaunee Supreme Air	5	6	Hood sash closure OK
62	246	1	Kerr	Mott Sigma	7	7	Hood alarms when sash is closed
62	308	4	Kerr	ThermoScientific Hamilton SafeAire II	8	8	Hood sash closure OK
62	308	5	Kerr	ThermoScientific Hamilton SafeAire II	8	8	Hood sash closure OK
62	310	4	Richardson	ThermoScientific Hamilton SafeAire II	7	7	Hood sash closure OK
62	310	5	Richardson	ThermoScientific Hamilton SafeAire II	7	7	Hood sash closure OK
62	312	1	Richardson	ThermoScientific Hamilton SafeAire II	8	9	Hood sash closure OK
62	314	2	Richardson	ThermoScientific Hamilton SafeAire II	6	7	Hood sash closure OK
62	320	2	Richardson	ThermoScientific Hamilton SafeAire II	8	8	Hood sash closure OK
62	342	4	Cabana-Jimenez	ThermoScientific Hamilton SafeAire II	7	9	Hood sash closure OK
62	342	5	Cabana-Jimenez	ThermoScientific Hamilton SafeAire II	7	9	Hood sash closure OK
62	348	2	Balsara	ThermoScientific Hamilton SafeAire II	7	6	Hood sash closure OK
62	348	3	Balsara	ThermoScientific Hamilton SafeAire II	7	6	Hood sash closure OK
62	350	4	Richardson	ThermoScientific Hamilton SafeAire II	8	8	Hood sash closure OK
70	103	1	Lunden	Old Wood-Sash	7	6	Hood alarms when sash is closed
70	103	2	Lunden	Old Wood-Sash	7	6	Hood alarms when sash is closed
70	103	3	Lunden	Old Wood-Sash	7	6	Hood alarms when sash is closed
70	103	4	Lunden	Old Wood-Sash	7	6	Hood sash sticks and unable to close
70	108	8	Kostecki	Kewaunee Supreme Air	6	10	Hood sash closure OK
70	123	7	Balsara	Hamilton SafeAire	6	8	Hood sash closure OK
70	134	1	Lunden	Kewaunee	5	4	Hood sash closure OK
70	138	1	Destaillats	Old Wood-Sash	7	7	Hood alarms when sash is closed

70	157	2	Russo		9	9	Hood sash closure OK
70	163	1	Mao	Old Wood-Sash	2	3	Hood sash sticks and unable to close
70	173	1	Cheng	Kewaunee	8	7	Hood sash sticks and unable to close
70	201	3	Gundel	Hamilton SafeAire	6	6	Hood alarms when sash is closed
70	201	4	Gundel	Hamilton SafeAire	6	6	Hood alarms when sash is closed
70	215	5	Kirchstetter	Hamilton SafeAire	8	8	Hood sash closure OK
70	217	1	Gundel	Old Wood-Sash	6	6	Hood sash sticks and unable to close
70	218	1	Battaglia	Duralab	5	5	Hood sash closure OK
70	220	1	Mao	Kewaunee	6	6	Hood Sash Missing. Needs Repair. Missing sash door.
70	221	1	Mandalena	Old Wood-Sash	8	8	Hood sash sticks and unable to close
70	223	1	Mandalena	Old Wood-Sash	6	7	Hood alarms when sash is closed
70	223	2	Mandalena	Fisher	7	8	Hood sash closure OK
70	226	1	Liu	Old Wood-Sash	6	7	Hood alarms when sash is closed
70	249	1	Mao	Old Wood-Sash	3	3	Hood sash sticks and unable to close
70	249	2	Mao	Old Wood-Sash	5	6	Hood sash sticks and unable to close
70	249	3	Mao	Old Wood-Sash	7	7	Hood sash sticks and unable to close
70	257	1	Weber	Kewaunee	6	5	Hood sash closure OK
70	257	2	Weber	Kewaunee	6	6	Hood sash closure OK
70	257	3	Weber	Kewaunee	6	5	Hood sash closure OK
70	263	1	Srinivasan	Kewaunee	10	9	Hood sash closure OK
70	263	2	Srinivasan	Kewaunee	10	10	Hood sash closure OK
70	260	1	Mandalena	Kewaunee	7	8	Hood sash closure OK
70	269	10	Chang	Hamilton SafeAire	7	8	Hood sash closure OK
70	269	8	Chang	Hamilton SafeAire	6	8	Hood sash closure OK
70	269	9	Chang	Hamilton SafeAire	6	6	Hood sash closure OK
70	269	11	Chang	Thermo Scientific	7	7	Hood sash closure OK

70	274	8	Slack	Hamilton SafeAire	9	9	Hood sash closure OK
70	275	1	Gundel	Old Wood-Sash	5	5	Hood sash sticks and unable to close
70	289	1	Mandalena	Old Wood-Sash	4	5	Hood sash sticks and unable to close
70	291	1	Lucas	unknown/unmarked	6	7	Hood sash closure OK
70	293	2	Lucas	unknown/unmarked	5	9	Hood sash closure OK
70	295	1	Battaglia	unknown/unmarked	7	7	Hood sash closure OK
70	295	2	Battaglia	unknown/unmarked	6	6	Hood sash closure OK
070	299	1	Battaglia	unknown/unmarked	6	7	Hood sash closure OK
070	299	2	Battaglia	unknown/unmarked	7	7	Hood sash closure OK

ATTACHMENT 3 – Sash Sticker



ATTACHMENT 4- Fume Hood Training

9/28/12

FUME HOOD SAFETY

Environmental Energy Technologies Division
Safety Topic

July 12, 2012

1

Fume Hoods

- Fume hoods are installed in laboratories to protect workers from hazardous contaminants generated by experiments.
- The fume hood must be used properly in order to provide adequate protection.
- There are some simple precautions you can take to ensure your protection:
  - ✓ Check airflow indicator (s)
  - ✓ Reduce obstructions
  - ✓ Keep sash closed
  - ✓ Keep work 6 inches inside the hood
  - ✓ Limit turbulence in front of the hood

2

Check Air Flow

- Check the air flow prior to each use of the hood to ensure it is drawing the appropriate amount of air.
- Each hood is equipped with a digital airflow monitor that displays the face velocity.
- Average face velocity should be at or above 100 feet per minute.
- It the airflow is too low, a visible and audible alarm will sound.
- Do not use a hood that does not meet minimum flow requirements!
- DO NOT attempt to modify settings. Contact EHS if you think there is a problem with the monitor or would like an airflow check.

3

Fume Hood Housekeeping

- Obstructions inside the hood can reduce the effectiveness of the fume hood.
- Minimize storage inside the hood. Keep at least 50% of the work area clear.
- Always place containers and work at least 6 inches from the hood face.
- Keep the exhaust slots at the back of the hood clear.
- To minimize airflow disruption:
  - Keep a 3 inch gap along the sides and back of the work surface.
  - Elevate large piece of equipment 2-3 inches.
  - Keep a 2-3 inch gap between equipment.

Poor Storage

Good Storage

4

1

9/28/12

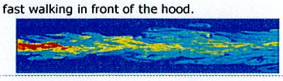
Keep Hood Sash Closed

- Keep the sash height 18 inches or less from the working surface while working in the hood.
- The sash should be kept **CLOSED** when you are not working in the hood. This adds to your safety!
- Significant energy is consumed when sashes are left open. This results in unnecessary costs to LBNL and a waste of resources.
- Color coded reminder stickers are being placed on all EETD lab area fume hoods.

5

Limit Turbulence in Front of Hood

- Air turbulence can affect the adequate containment of hazardous contaminants inside the hood, creating possible exposure issues.
- You can minimize air turbulence by doing the following:
  - ✓ Keep work at least 6 inches inside the hood.
  - ✓ Elevate large piece of equipment.
  - ✓ Don't open doors and windows near hoods. This can alter the airflow balance in a room and disrupt airflow into the fume hood.
  - ✓ Minimize traffic or movement in front of the hood when working with chemicals.
  - ✓ Avoid fast walking in front of the hood.



6

Fume Hood Maintenance

- All fume hoods are checked and calibrated at least every two years.
- A sticker on the hood documents each survey.
- Fume hoods that fail the minimum exhaust flow requirements must be taken out of service until repaired or corrected.
- If a fume hood is alarming or not operating properly, contact the Facilities Work Request Center at X6274 (X5481 after hours).

7

More Information

- Review the hazard controls section of the Chemical Hygiene and Safety Plan.
- For additional information on proper fume hood use, see the following link from Labconco:
  - Labconco Fume Hood Video
  - **http://www.youtube.com/watch?v=q2Pp3wge2j8**

8

2

ATTACHMENT 5- Safety Alert

Environmental Energy Technologies Division

SAFETY ALERT

August 21, 2012

KEEP HOOD SASHES CLOSED WHEN NOT IN USE

Fume hoods represent the first line of worker safety measures in a research laboratory. Providing supply and exhaust air to fume hoods is highly energy intensive. A typical six-foot hood exhausting air at 100 linear feet per minute (fpm) and open 18 inches exhausts almost 1.5 million cubic feet of conditioned air every day. It takes a significant amount of energy to operate the exhaust fans needed for all this air. It also takes a lot of energy to cool or heat this air.

EETD lab workers can do their part to help significantly reduce energy costs and improve safety at the same time.

- Keep the hood sash **CLOSED** when you are not working in the hood.
- Close the hood sash before you go home each night.
- Keep the sash opening no higher than the limit arrows or sash stop while working in the hood.
- Follow good housekeeping practices inside the hood. Keep the front 6 inches clear and avoid clutter and obstructions in front of the exhaust slots and along the sides of the hood.

EETD has partnered with EH&S Division to apply color-coded reminder stickers to fume hoods in all EETD lab areas. We'll do periodic checks to determine the effectiveness of these stickers. In addition, building energy usage data will be tracked to determine energy savings as this awareness program continues. The results of this project will be made available to EETD personnel later this year.

ATTACHMENT 6- Hood Sash Reminder Poster

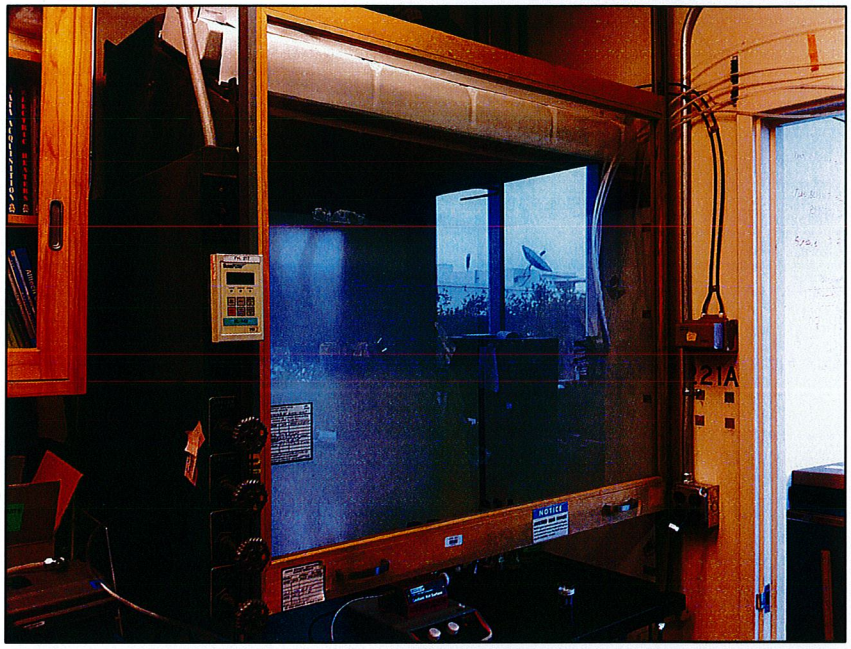
A Closed Sash = More Safety and Less Energy

- Keep the hood sash **CLOSED** when you are not working in the hood. Don't forget to close the sash before you go home!
- Keep the sash height within the limit arrows or sash stop while working in the hood.
- Practice good housekeeping inside the hood – keep the front 6 inches clear and avoid blocking sides and back.
- Look for the color-coded reminder stickers on all EETD area fume hoods.
- Remember that significant energy is consumed when sashes are left open.

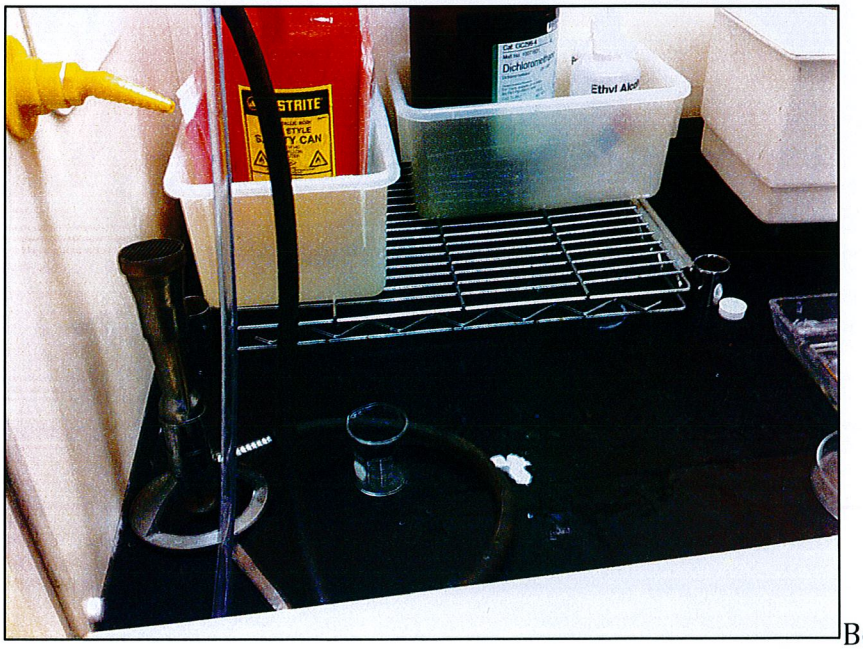
BERKELEY LAB

1

ATTACHMENT 7- Photos



Old "Wood-Sash" type hood



Best Practice- Rack used for Storage